Blaise Internet 4.8.4

Load and Performance Testing

Lane Masterton
Assistant Statistician
Technology Services Division
Australian Bureau of Statistics

Content

1. Purpose
2. Test Targets
3. Approach
4. Solution Architecture
5. Test Environment
6. Tools
7. Test Results
8. Results Summary
9. Challenges and Issues
10. Conclusion
11. Questions

Purpose

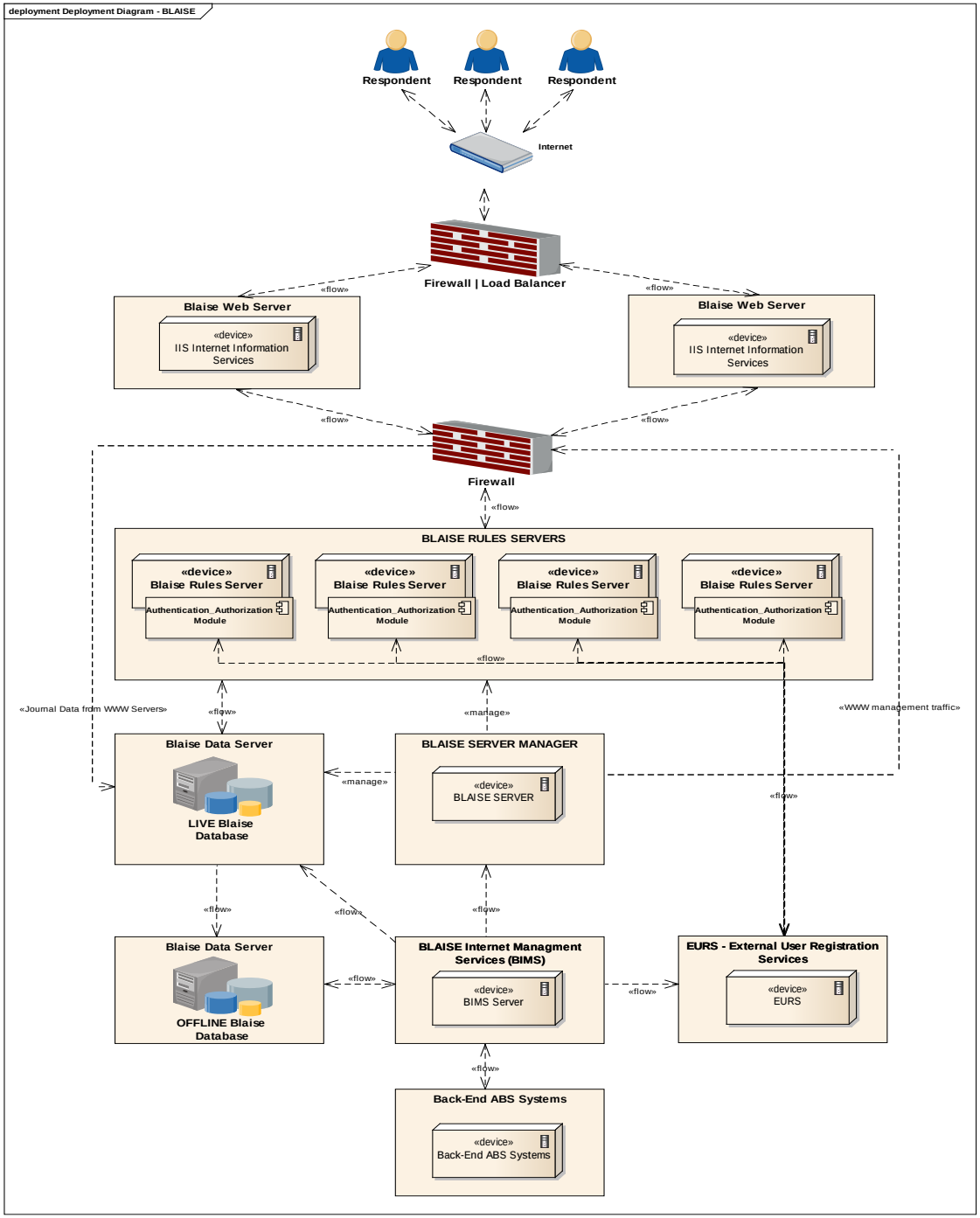
- To ensure a stable and responsive online provider experience
- System must have enough capacity to support all planned ABS eForms
- August 2013
  - 3,938 eForm submissions expected on peak day
  - 358 eForm submissions expected hourly on average
  - 600 eForm submissions expected in peak hour

Milestone	Expected eForms	Collections
Aug 2013	126,550	13
Dec 2013	175,500	18
July 2014	298,500	22
Jan 2015	329,500	24

Load and Performance Targets

- Load modelling based on existing paper form return metrics
- Ensure we have capacity to process expected combined survey returns on any day and in peak time
- Performance must meet:
  - 15 seconds for login transaction
  - 5 seconds for all other transactions
  - No system performance degradation over time

ABS Blaise 4.8.4 eCollect Solution Architecture



Test Environment

Blaise Park Component	Operating System	Software	Hardware Specification
Blaise Web Server **2 Servers**	Windows Server 2008 R2	Blaise 4.8.4.1767 Microsoft Internet Information Services (IIS 7)	4 x CPUs @ 2.7Ghz Intel Xeon E5-26800 * 4GB RAM
Blaise Rules Server **4 Servers**	Windows Server 2008 R2	Blaise 4.8.4.1767	2x 4 CPUs @ 2.93Ghz Intel Xeon X5570 2x 4 CPUs @ 2.7Ghz Intel Xeon E5-26800 4GB RAM
Blaise Data Server **1 Live DB Server** **1 Offline DB Server**	Windows Server 2008 R2	Blaise 4.8.4.1767	4 CPUs @ 2.93Ghz Intel Xeon X5570 4GB RAM 2 CPUs @ 2.93Ghz CPU Intel Xeon X5570 4GB RAM
Blaise Management Server **1 Server**	Windows Server 2008 R2	Blaise 4.8.4.1767	2 CPUs @ 2.93Ghz CPU Intel Xeon X5570 2GB RAM
BIMS Server **1 Server**	Windows Server 2008 R2	Blaise 4.8.4.1767 Microsoft Internet Information Services (IIS 7)	2 CPUs @ 2.93Ghz CPU Intel Xeon X5570 2GB RAM

Tools

- HP Performance Centre 9.5
  - LoadRunner, VuGen and Analysis tools for load generation and analysis
- ABS PG3 tool for monitoring server metrics:
  - CPU, memory, disk, network bandwidth etc.

Endurance Test

Test Parameters

127 Concurrent Virtual users for 8 hours,

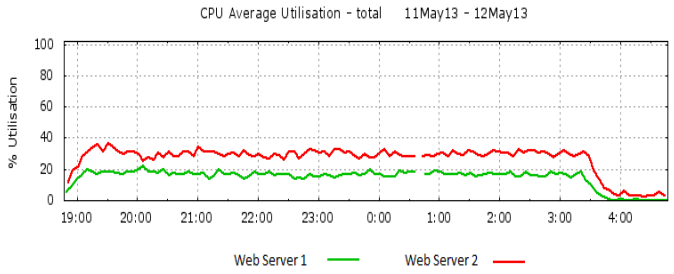
Target 397 survey submissions an hour

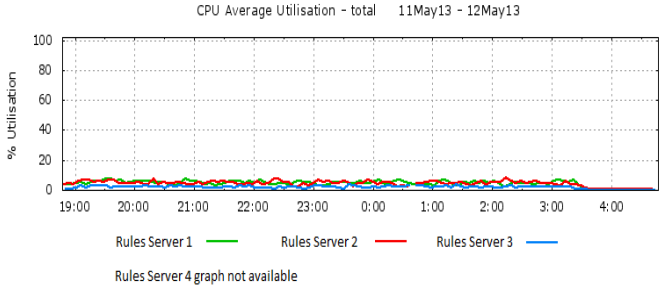
Objective

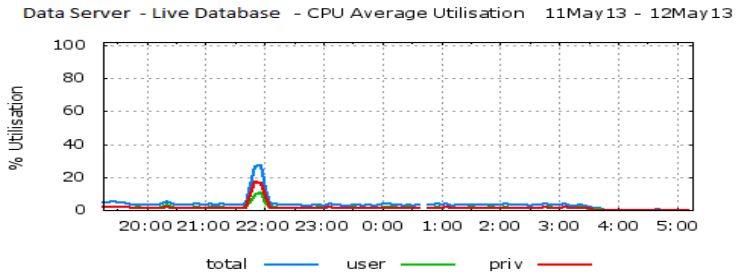
Verify system can handle a typical load for prolonged period without performance degradation

Results

- 3,231 surveys submitted as per targeted rate
- No errors, no transaction failures, no memory leaks and no response time degradation during the test
- At 512Kbps and 2048Kbps network speeds:
  - Page to page transactions were within SLAs of 5 secs
  - Login transactions were within SLA of 15 secs
- At 56Kbps and 64Kbps network speeds:
  - Page to page transactions exceeded SLAs and were 10-20 secs and as high as 40secs
  - Login transactions exceeded 15 seconds and were as high as 80 seconds
- CPU utilization on Web Servers 35%, 10% on Rule Servers, and less than 10% on the Database Server







The peak at 22:00 was caused by security software updates and was not related to load testing

Stress Test 1

Test Parameters:

370 Concurrent Virtual users for 2 hours,

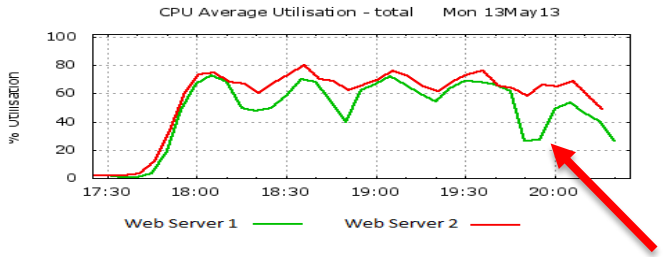
Target 1,090 submissions an hour

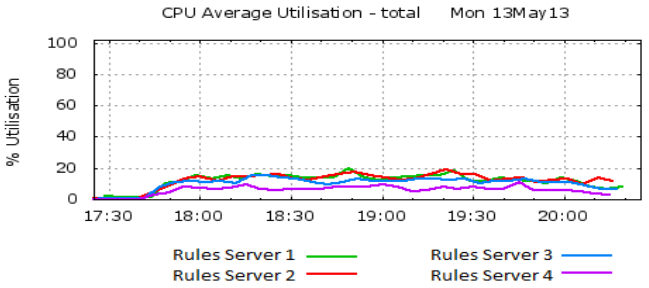
Objective

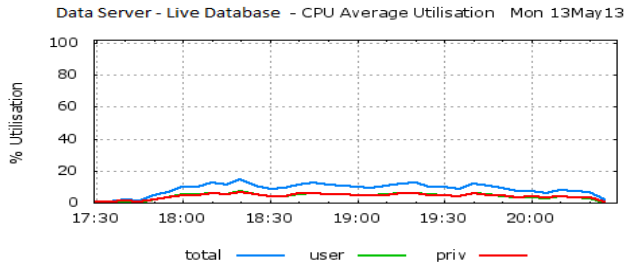
Verify if the system can sustain additional load without any issues for selected production surveys

Results - Failed

- 940 surveys submitted in one hour
  - Test was not successful
- Many errors at 19:40 - 19:52, connection time-outs between the Blaise API Services3 and the Journal Database.
  - Error: BlJour3A.Journal: Could not connect to BlaiseAPIService3 (Socket Error # 10060-Connection timed out.);
- 1,600 TCP/IP sockets were observed in TIME_WAIT state on the Blaise Data Server.
- CPU utilization on Web Servers peaked at over 80%, and was around 20% on Rules Servers and Data Server.



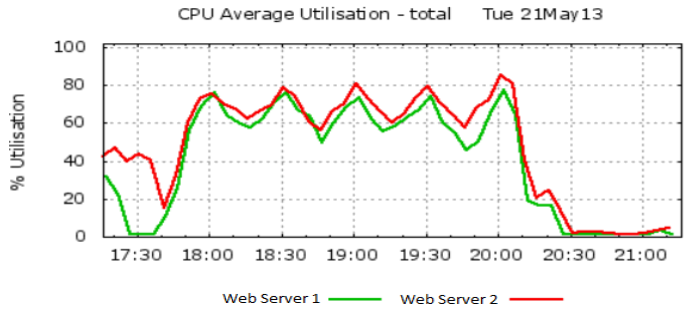


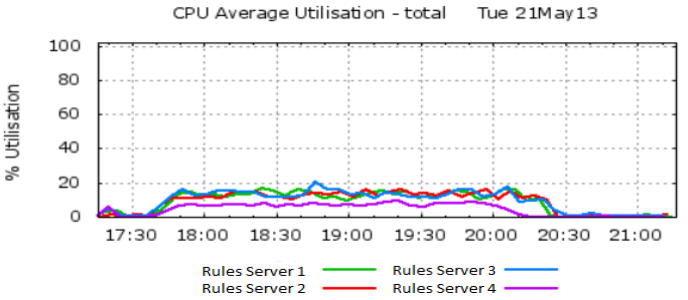


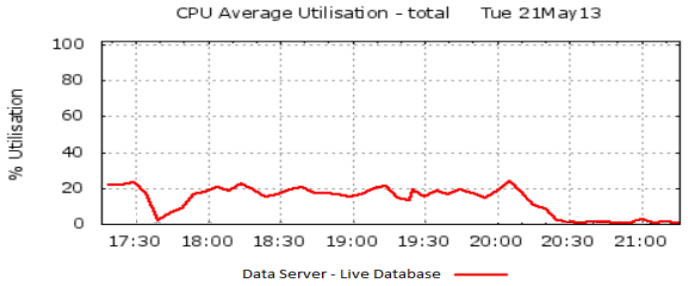
Stress Test 1

Results - Success

- A fix in the form of a Windows Registry setting for the TIME_WAIT value was identified through research on the internet and applied to the Blaise Data Server
- 1,090 surveys submitted in one hour as per target rate
- CPU utilization on Web Servers peaked at over 80%, and was around 20% on Rules Servers and Data Server.







Stress Test 2

Test Parameters

441 Concurrent Virtual users for 2 hours,

Target 3,097 submissions an hour.

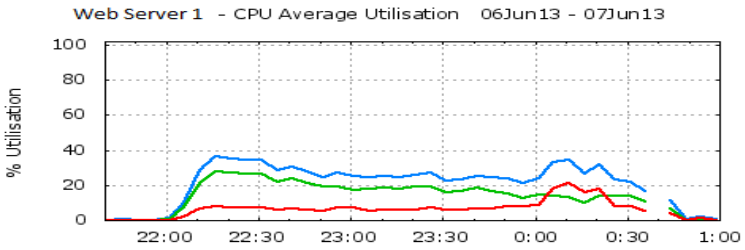
Objective

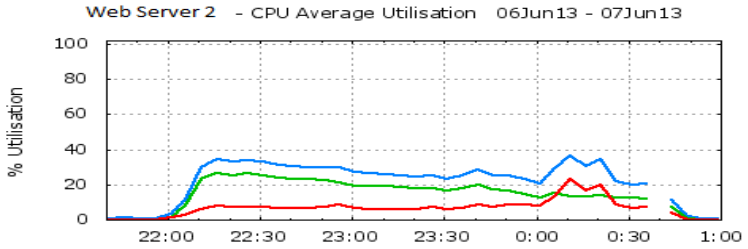
This test was aimed at pushing the limits of the Blaise IS in its current configuration, but without the ABS authentication and authorisation module

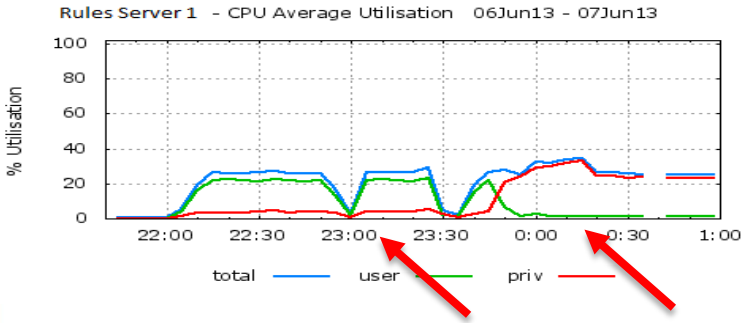
Results

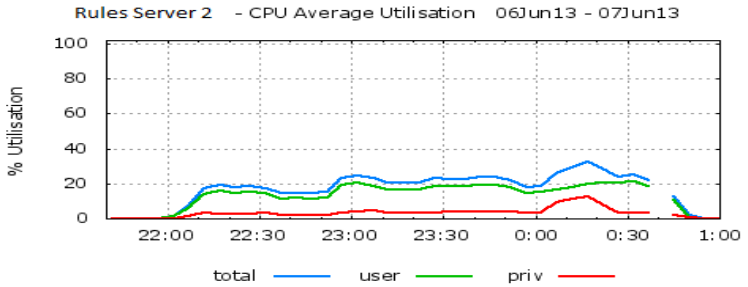
- A lot of errors and failures were seen throughout the test run.
  Errors were due to out-of-memory errors reported on the Rules Servers
- The target of 3,307 submissions per hour was not reached as there were many failures
- Interestingly, while the out of memory errors were reported by the Blaise Rules Servers, the affected Rules Servers had a significant amount of available memory, at least 1GB on each Rules Server
- The results from this test need to be investigated further

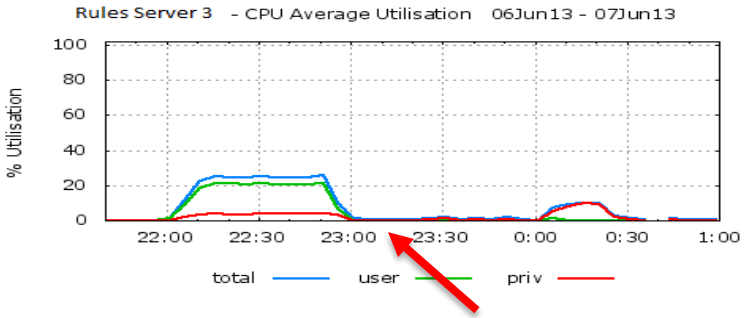
Stress Test 2

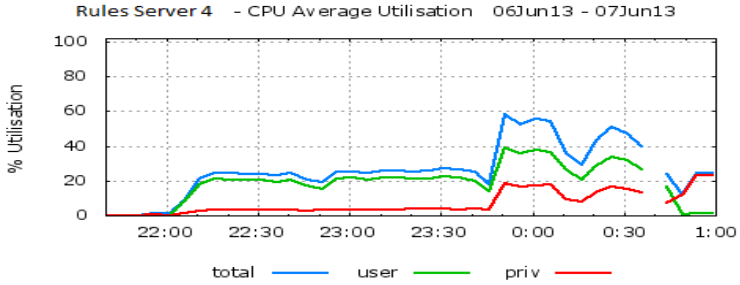


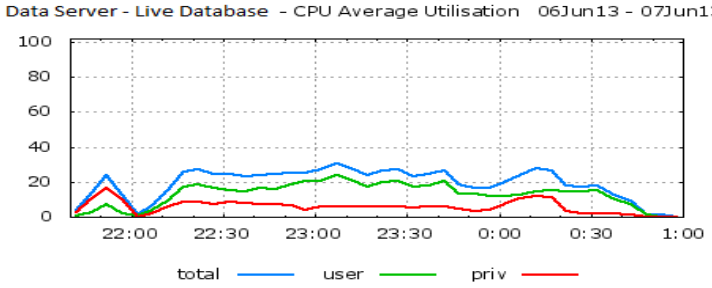












Stress Test 3

Test Parameters:

441 Concurrent Virtual users for 2 hours,

Target 1,397 submissions an hour

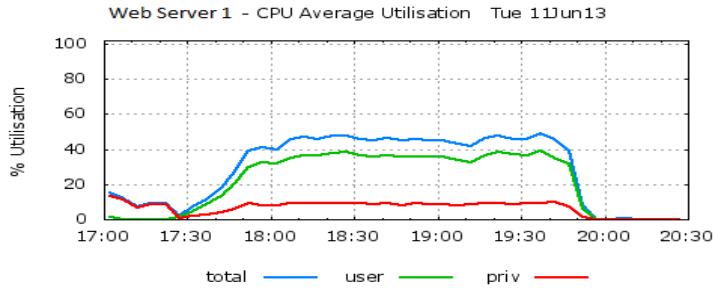
Objective

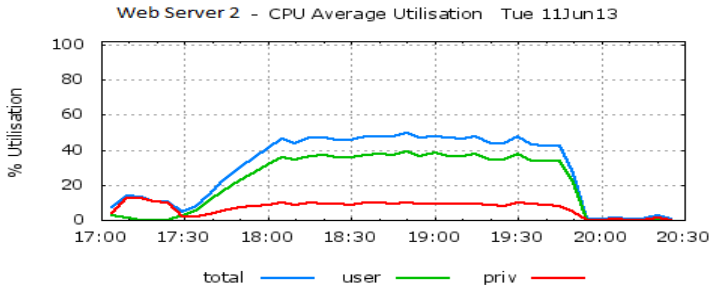
Verify if the system can sustain additional load without any issues for selected production surveys

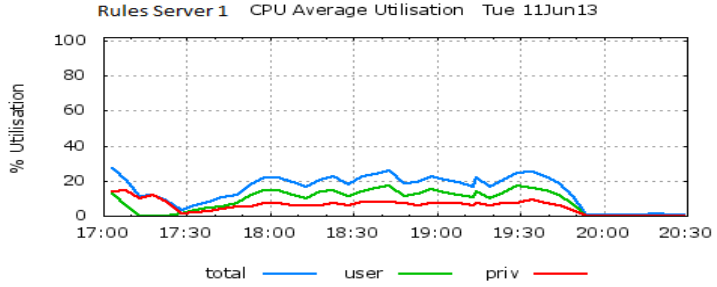
Results

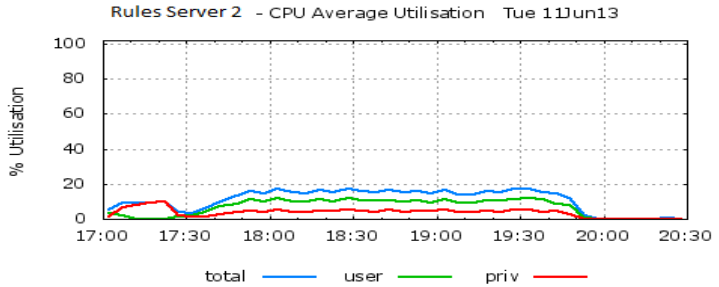
- Total surveys submitted were 2,795 and it was as per the target rate
- There were no errors seen throughout the execution of the test run.
- At 512Kbps and 2048Kbps network speeds:
  - Page to page transactions were within SLAs of 5 secs
  - Login transactions were within SLA of 15 secs
- At 56Kbps and 64Kbps network speeds:
  - Page to page transactions exceeded SLAs and were 10-20 secs and as high as 40secs
  - Login transactions exceeded 15 seconds and were as high as 80 seconds
- CPU Utilization on web servers was averaging around 50%.
  CPU utilization on rule severs was averaging at 30% and on data server was 20%

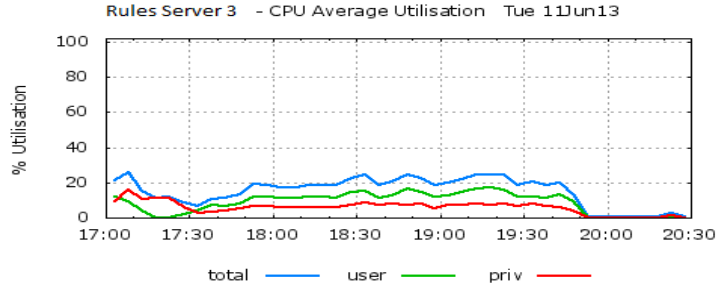
Stress Test 3

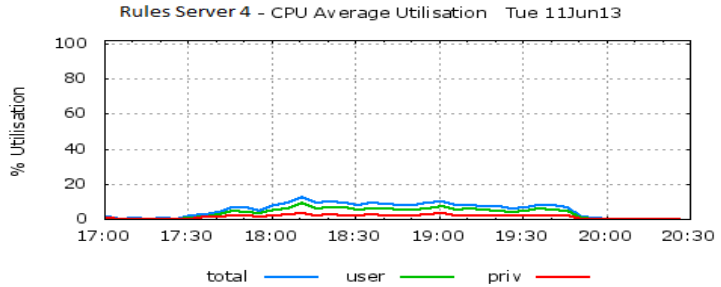


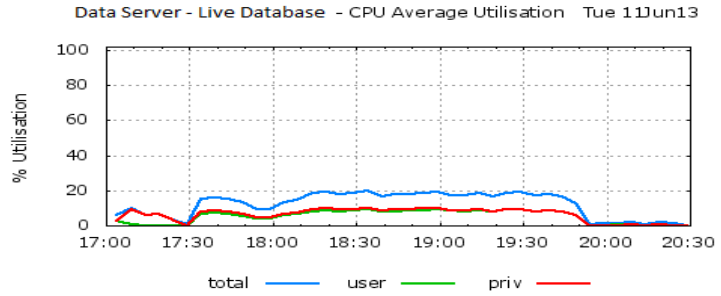












Data Extraction Test

Test Parameters:

221 Virtual users for 2 hours + Data Extraction,

Target 696 submissions an hour

Objective

Verify the effect of data extraction on the end user response times and also to validate the performance of the ABS data extraction module

Results

- Total surveys submitted were 1,685 and it was as per the target rate
- There were no errors seen throughout the execution of load test run
- The data extraction module was able to handle 1 hour of data in less than 2 minutes and had negligible impact on front end system performance
- On average it took 20 seconds to extract 300 records (survey submissions)
- CPU utilization on Web Servers, Rules Servers and Data Server was averaging around 20%.

Summary of Results

- Blaise eCollect system was able to run 441 concurrent users achieving 1,397 survey submissions an hour
- Sustained performance under load with 127 concurrent users over 8 hours and 3,391 surveys submitted without any performance degradation
- Good data extraction performance under load. ABS data extraction module was able to handle 1 hour of data in less than 2 minutes and had negligible impact on front end system performance
- At 512Kbps and 2048Kbps network speeds:
  - Page to page transactions were within SLAs of 5 secs
  - Login transactions were within SLA of 15 secs
- At 56Kbps and 64Kbps network speeds:
  - Page to page transactions exceeded SLAs and were 10-20 secs and as high as 40secs
  - Login transactions exceeded 15 seconds and were as high as 80 seconds

Blaise 5 - Early Findings

Approach

- Focusing on a candidate Population Census form
- Understanding both the capability of Blaise 5 Instrument design and server capacity and scalability
- Understand the scalability of both servers and Blaise Parks and the optimal configuration of these

Initial Testing results

- Initial testing of Blaise 5, on similar infrastructure and Blaise server configuration to 4.8.4 testing shows a single configuration of a Web, Data Entry and Data Server should hold ~600 concurrent users, we saw ~220 under Blaise 4.8.4

- More detailed load testing information available from performance counters and .NET CLR, enabling more detailed analysis and quicker resolution of issues encountered

Areas which provide significant future opportunities

- Greater flexibility for system integration
    - Database options for SqlServer or Oracle
    - Alien Procedure calls for web services
    - Linkages with Authentication and Authorisation solutions
    - Reduce dependence on complex systems tied closely to Blaise APIs

Australian Bureau of Statistics

Thank you.

and

Questions ?